NUMBER 18

Proceedings

of

The Canadian Phytopathological Society

Seventeenth Session

June 26-30, 1950.

CHARLOTTETOWN
P.E.I.

Issued Jan. 27, 1951.

Editorial Committee
J. W. GROVES
L. C. CALLBECK
R. E. FITZPATRICK
A. J. SKOLKO

89 ALLIED PRINTERS CANADA

NUMBER 18

Proceedings

of

The Canadian Phytopathological Society

Seventeenth Session

June 26-30, 1950.

CHARLOTTETOWN
P.E.I.

Editorial Committee
J. W. GROVES
L. C. CALLBECK
R. E. FITZPATRICK
A. J. SKOLKO

89

The Canadian Phytopathological Society

LIST OF OFFICERS AND COUNCIL
1949-1950

President

D. J. MacLEOD, Laboratory of Plant Pathology, Fredericton, N.B.

Vice-President

WM. NEWTON, Laboratory of Plant Pathology, Saanichton, B.C.

Secretary-Treasurer

A. J. SKOLKO, Division of Botany and Plant Pathology, Science Service, Ottawa, Ont.

Councillors

RENE POMERLEAU, Department of Lands and Forests, Quebec, P.Q.
A. W. HENRY, University of Alberta, Edmonton, Alta.

Copies of the Proceedings of the Canadian Phytopathological Society may be obtained from the secretary-treasurer at a price of 50 cents each.

L. to R. L. C. Callbeck, R. R. Hurst, J. H. Craigie, R. H. Bagnall, R. O. Lachance, G. H. Berkeley, G. C. Chamberlain, R. E. Fitzpatrick, H. R. McLarty, P. M. Simmonds, W. Newton, L. E. Tyner, W. A. Hodgson, A. J. Skolko, P. McKinnon, D. B. Robinson, R. G. Ross, W. H. Minshall (back), D. J. MacLeod (front), G. W. Ayers, W. E. McKeen, Mrs. W. E. McKeen, J. F. Hockey, W. E. Sackston, R. V. Clark. Absent K. W. Neatby, F. J. Greaney.

Annual Meeting, C.P.S., Charlottetown, P.E.I., June 26-30, 1950.

John Arthur Thornton

1919 - 1950

John Arthur Thornton was born at Calgary, Alberta, on January 3, 1919. He served overseas in the R.C.A.F. as a radar technician and attained the rank of sergeant. Upon discharge from the Air Force on November, 1945, John commenced studies at the University of Alberta in the Faculty of Agriculture. During the summer of 1947, he was employed by the Department of Plant Science, University of Alberta. During the summers 1948 and 1949, he was employed by the Dominion Laboratory of Plant Pathology, Edmonton, Alberta. John died on March 14, 1950 after a prolonged illness. In spite of his handicap, he completed most of the work for the degree of Bachelor of Science in Agriculture and was awarded this degree posthumously by the University of Alberta in May, 1950. He is survived by his wife, two daughters, his father and mother, two sisters and two brothers.

MINUTES OF THE SEVENTEENTH MEETING HELD AT CHARLOTTETOWN, PRINCE EDWARD ISLAND JUNE 26 TO 30, 1950

Business Sessions: June 26 and June 30

The 17th meeting of the C.P.S. was opened on June 26, 1950 at 8 p.m. in the Vocational Wing of the Prince of Wales College, Charlottetown, P.E.I.

The President welcomed members to the meeting and pointed to the fact that this represented the 21st year since the founding of the Society. He thought it particularly appropriate that we should be meeting in Charlottetown since it was here that the first plant pathological laboratory in Canada was established.

In reviewing the present status of the Society, the President noted that the membership of the Society would reach a new high with the many applications for membership which have been received. He also pointed to the fact that the financial position of the Society was a sound one. Dr. MacLeod, in reviewing the events in the first 21 years of the Society, mentioned the names of our past presidents and the locations at which the meetings had been held. He pointed to the fact that Dr. F. J. Greaney, one of our members, was president of A.I.C., a position which had also been held by Dr. K. W. Neatby. He announced that another of our members, Dr. J. D. MacLachlan had recently been appointed president of O.A.C.

With these opening remarks the President then called for adoption of the minutes of the 16th meeting which had been distributed to the membership. Moved by Dr. W. E. Sackston and seconded by J. F. Hockey, the minutes were adopted.

In considering the business arising out of the minutes, a report prepared by Prof. A. R. Walker relative to the formation of a Canadian Microbiological Council was read. The report indicated that progress had been made during the year towards the establishment of such a society. It was moved by Dr. H. R. McLarty and seconded by Dr. P. M. Simmonds that Prof. Walker continue to represent the C.P.S. in any further developments in this connection during the coming year. The motion was carried.

The report of the Sec.-Treasurer was read and accepted on motion of Dr. W.E. Sackston and Dr. G. H. Berkeley. Discussion of the desirability of continuing the C.P.S. News resulted in a motion by Dr. H. R. McLarty, seconded by J. F. Hockey, that the Sec.-Treasurer be instructed to select an editor of the C.P.S. News in order that the News might be continued. The motion was carried.

The report of the Custodian of the Library and Records was read by the Sec.-Treasurer and adopted on motion of Dr. L. E. Tyner and G. C. Chamberlain.

The report of the Editorial Committee was presented by the Sec.-Treasurer and adopted on motion of G. W. Ayers and J. F. Hockey.

Dr. Tyner presented the report of the Terminology Committee and on his motion, seconded by Dr. G. H. Berkeley, the report was adopted.

Under new business, the President announced that an invitation had been received from Laval University for the Society to hold its annual meeting in 1952 in Quebec City in connection with the observance of the 100th anniversary of the founding of the University. It was moved by Dr. W. E. Sackston and seconded by Dr. R. O. Lachance that the invitation be given every consideration and if acceptance is feasible that the council be empowered to do so. Motion carried.

An invitation from the 5th International Congress for Microbiology which is to be held in Rio de Janeiro in August, 1950, for the Society to have representation at the Congress, was presented to the meeting. It was moved by R. R. Hurst and seconded by Dr. P. M. Simmonds that Dr. G. A. Ledingham be appointed as official delegate of this Society. Carried.

The meeting was informed by the President that Dr. J. W. Groves had been appointed by the council to represent the society at the 7th International Botanical Congress being held in Stockholm.

The question of the desirability of establishing an associate member class in the Society was discussed and, since the matter had been carefully considered by the regional groups during the year, and, since the majority of the groups decided that the establishment of such a class was undesirable, it was decided that further action on this matter should be dropped. It was noted by the secretary that a further printing of the Constitution of the Society was required. On motion by J. F. Hockey and Dr. G. H. Berkeley, it was agreed that the Editorial Committee should be instructed to take care of this matter and incorporate any amendments which have been made since the last printing.

The election of members of the Nominating Committee for the coming year returned the following :

Dr. D. J. MacLeod, Dr. A. W. Henry, L. C. Callbeck, G. W. Ayers, Dr. R. O. Lachance.

Approval by the Society to the change of the name of the Centigrade temperature scale to Celsius was recorded.

Honoraria for stenographic assistance, amounting to $20 for the stenographer of the Secretary-Treasurer and $10 for assistance to L. C. Callbeck of the Program Committee was approved by the meeting.

The following membership applications were accepted by the meeting: James Ewen Campbell, Robert Vernon Clark, Mary E. Elliott, J. C. Hamilton, Elmer Joseph Hawn, A. D. H. Henderson, Jack Stewart Horricks, Semeon Bohdan Hrushovetz, Ben M. Lawson, Constance Amy Loveland, Peter F. Melnyk, Margaret E. Norris, William Robert Orchard, Jack Sibalis, Richard Stace-Smith, George Philip Thomas, Robert Davies Tinline, Walter Trossman, Alfred T. S. Wilkinson.

The following members were elected to honorary membership:

Prof. H. S. Jackson, S. G. Peppin, Dr. Donald Reddick.

The report of the Resolutions Committee was presented by J. F. Hockey and accepted on motion by Mr. Hockey and G. C. Chamberlain.

The retiring president, Dr. D. J. MacLeod, then expressed his appreciation of the support given him by the Council and Executive during the year and turned the meeting over to the president-elect, Dr. Wm. Newton. The new president expressed his appreciation of the honour conferred upon him and urged the regional groups to participate fully in the activities of the Society.

Dr. Newton then announced the following committee appointments:

Publicity & Program Committee: W. E. Sackston (chairman), J. E. Machacek, I. C. MacSwan, A. J. Skolko.

Resolutions Committee : W. F. Hanna (chairman), W. J. Cherewick, Henri Genereux, Miss F. C. Mellor.

Editorial Committee : J. W. Groves (chairman), L. C. Callbeck, R. E. Fitzpatrick, A. J. Skolko.

Terminology Committee: A. W. Henry (chairman), D. L. Bailey, D. C. Buckland, J. H. Craigie, H. M. Good, W. A. F. Hagborg, C. D. McKeen, R. Pomerleau, L. E. Tyner, M. F. Welsh, T. C Vanterpool.

Custodian: T. Johnston.

Auditors: J. W. Groves & M. K. Nobles.

It was suggested by the President that the regional groups elect their own regional representatives at their first meeting and that the regional representatives of the past year continue to act in that capacity until elections can be held.

RESOLUTIONS

Whereas the members of the Canadian Phytopathological Society, on the occasion of the annual convention of the Agricultural Institute of Canada, June 26-30, 1950, have enjoyed excellent facilities and many courtesies;

Be it resolved that we extend our sincere gratitude to:

1. Our hosts, the P.E.I. Branch of the Agricultural Institute of Canada.

2. Messrs. R. R. Hurst and L. C. Callbeck and their colleagues at Charlottetown who have arranged the facilities and programme for the Society meetings.

PROGRAMME

The C.P.S. dinner was held at the Charlottetown Hotel on June 27th with 25 members and guests in attendance. Mr. S. G. Peppin, Officer-in-Charge, Plant Protection Division, Charlottetown, P.E.I. was the guest speaker and presented an historical review of the development of the potato seed certification scheme in Prince Edward Island.

Following the opening business session, two sessions were devoted to the presentation of papers. Abstracts of the fourteen papers presented are published in this issue of the Proceedings.

REPORT OF THE NOMINATING COMMITTEE

Some eighteen nominations for the various offices were received and voted on following the circulation of a list on January 25, 1950. Based on this, the Nominating Committee submits the following slate of officers for 1950-51.

President — Dr. Wm. Newton
Vice-President — Dr. G. H. Berkeley
Secretary-Treasurer — Dr. A. J. Skolko
Councillors — Dr. M. W. Cormack, Dr. D. J. MacLeod

The suggestion is made to the Executive that a Constitutional Committee be appointed for one year to bring the Constitution of the C.P.S. up-to-date and to suggest improvements in it.

Respectfully submitted by the Nominating Committee.

D. L. Bailey
I. L. Conners
R. R. Hurst
J. C. Perrault
A. W. Henry (Chairman)

REPORT OF THE EDITORIAL COMMITTEE

The Proceedings of the Sixteenth Session of the Canadian Phytopathological Society reporting the meetings held at Vancouver, B.C., from June 20 to 24, 1949, were issued on January 20, 1950. Included in the Proceedings are abstracts of 25 papers presented at the meeting and 92 titles of papers published by members of the Society between June 1, 1948 and May 31, 1949.

The Editorial Committee makes the following suggestions for consideration of the incoming committee.

1. A footnote under the list of officers and council might be included in the Proceedings indicating how copies of the Proceedings might be obtained and at what price.

2. The inclusion in the Proceedings of photographs of members in attendance at the meetings.

Respectfully submitted,

B. J. SALLANS
J. G. COULSON
A. J. SKOLKO
D. B. O. SAVILLE (Chairman)

REPORT OF THE CUSTODIAN OF THE LIBRARY AND RECORDS OF THE SOCIETY

Accessions to the library during the past year include 53 reprints of published papers, 2 bulletins, and the 1949 Yearbook of the Royal Veterinary and Agricultural College, Copenhagen. These accessions have been indexed according to author. At present the library contains 303 items in addition to copies of Proceedings 1 - 17 of the Society and 27 copies of the Check List of Diseases of Economic Plants in Canada.

It would seem desirable that the records of the Society contain group photographs taken at annual meetings and photographs of individuals who have made important contributions to Canadian phytopathology. No such photographs are present in the records at Winnipeg. It is suggested that a group photograph of the members present at this year's meeting be sent to the Custodian and that an attempt be made to secure copies of photographs taken at earlier meetings as well as photographs of individuals who have played an important role in the foundation of phytopathology in Canada.

T. JOHNSON

REPORT OF THE TERMINOLOGY COMMITTEE OF THE C.P.S.

At the 1949 annual meeting of the C.P.S. approval was given to the suggestion made by the Terminology Committee in its report (Proc. No. 17 of the C.P.S., p. 8-9) that international action be sought to implement revision and standardization of the terminology of Plant Pathology.

The Committee has acted on the principle that it would be wise to ascertain the reaction of other national phytopathological groups before undertaking an extensive revision of present terminology.

Though in our last report it was suggested that a submission from the C.P.S. might well go forward to the 1950 International Botanical Congress at Stockholm, Sweden, further consideration by the Committee resulted in the decision not to present concrete proposals of suggested changes but instead to request Dr. W. A. F. Hagborg, a member of the Committee attending the Congress, to raise the question of the desirability of a standardized terminology of an international basis at the Phytopathological Section of the 1950 International Botanical Congress. This responsibility has been accepted by Dr. Hagborg. His report will be awaited with interest and will form basis for further action.

Respectfully submitted,

D. L. BAILEY
D. C. BUCKLAND
W. L. GORDON
W. A. F. HAGBORG
D. J. MacLEOD
F. L. DRAYTON
J. W. GROVES
L. E. TYNER } Joint Chairmen
A. W. HENRY }

REPORT OF THE SECRETARY-TREASURER

Mr. President and Fellow Members:

I have the honour to present herewith the report of the Secretary-Treasurer for the year ending May 31, 1950.

The sixteenth meeting of the Canadian Phytopathological Society was held at the University of British Columbia, Vancouver, B.C., June 20-24, 1949. Following the opening business session, three sessions were devoted to the presentation of papers, abstracts of which have been published in Proceedings No. 17 and distributed on Jan. 20, 1950.

Two numbers of the "C.P.S. News" were issued in February and March, 1950, and requests for reprints from non-members was very encouraging. The co-operation of the B.C. Mainland Region Group in providing material is gratefully acknowledged. Many of the western Regional Groups were very active during the year and their activities have been summarized in the "News".

The membership of the Society declined from 139 last year to 133 largely through failure of members to pay their fees. One member resigned. The death of John Arthur Thornton in March, 1950, is recorded with deep regret. Applications for membership have been received from 13 prospective members.

The slate of officers unanimously agreed upon by the Nominating Committee was distributed to the membership in February and since no further nominations were forthcoming the officers nominated were elected by acclamation.

The attached financial statement shows a favourable balance of $250 a slight increase over last year. Decreased returns in membership fees and increased stationery and postage charges have been offset by lower cost of publication of the Proceedings and increased receipts from their sale.

Respectfully submitted,

A. J. SKOLKO,
Secretary-Treasurer.

FINANCIAL STATEMENT
CANADIAN PHYTOPATHOLOGICAL SOCIETY

June 1, 1949 to May 31, 1950.

Revenue :			
Balance brought forward			$227.15
Fees :			
1948-49	$ 6.00		
1949-50	244.00		
1950-51	12.00		
		$262.00	
Interest on bond		15.00	
Sale of Proceedings		11.01	
			$288.01
			$515.16
Expenditures :			
Printing of Proceedings No. 17		138.24	
Honoraria for stenographic assistance		$ 25.25	
Stationery		61.88	
Postage		39.08	
Bank charges on current account		1.14	
			$265.59
Balance (on hand) May 31, 1950			$249.57
Additional Asset :			
Dominion of Canada 3% Victory Bond (Series K8Z32643)			$500.00

Audited and found correct,
(Signed) M. K. NOBLES
J. WALTON GROVES

ABSTRACTS OF PAPERS PRESENTED AT THE SEVENTEENTH MEETING OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

MILD RUGOSE MOSAIC OF SWEET CHERRY

G. H. BERKELEY, Dominion Laboratory of Plant Pathology, St. Catharines, Ont.

A disease on sweet cherry new to Ontario, called mild rugose mosaic, has been shown to be of virus origin. It differs from other diseases of sweet cherry in Ontario by producing annually a rugosity of the unfolding leaves, with mottling, and chlorotic rings, lines and patterns.

On Montmorency sour cherry symptoms of the same general type occur, though the percentage of affected leaves is much less than with sweet cherries.

On peach seedlings and varieties Elberta and Rochester the symptoms consist of slight to moderate delay in foliation, mottle and general stunting of leaves, and a mild shortening of internodes on some branches. Leaf mottling and general stunting of leaves recur each year.

On Italian prune and Lombard plum no definite or consistent symptoms have been observed, though on one inoculated tree a mild shortening of internodes occurred.

Cherry mottle leaf and cherry mosaic I, as reported from the West Coast, have in common with mild rugose mosaic a rugosity of unfolding leaves. This might suggest a possible relationship between these diseases. However, a comparison of their general symptoms on sweet cherry and other hosts would indicate that mild rugose mosaic is dissimilar to either cherry mottle leaf or cherry mosaic I.

A POSSIBLE QUICK METHOD FOR TESTING THE VIRULENCE OF STREPTOMYCES SCABIES (THAXT.) WAKSMAN AND HENRICI

L. V. BUSCH & J. D. GILPATRICK, Department of Botany, Ontario Agricultural College, Guelph, Ontario.

When slips from vigorously growing potato plants were placed in moistened vermiculite, small tubers were produced consistently within 3 or 4 weeks. Slips 4 or 5 inches long and cut at a node gave the best results.

Scab lesions were obtained when slips with formed tubers were planted in infested soil. Further work indicated that it may be possible to obtain infection by slipping directly into infested vermiculite.

CONTROL OF ANTHRACNOSE OF RED RASPBERRIES AND DOWNY MILDEW OF GRAPES IN ONTARIO

G. C. CHAMBERLAIN, Dominion Laboratory of Plant Pathology, St. Catharines, Ont.

Following a severe outbreak of Anthracnose *(Elsinoe veneta)* on Taylor red raspberries in 1945, experiments were initiated to determine the efficacy of sprays for the control of the disease. The programme consisted of a delayed dormant application of the eradicative fungicides, lime sulphur 1-10 or di-nitro-ortho cresylate 1% alone and in combination with a summer application of Fermate, Bordeaux or Phygon.

The delayed dormant spray alone provided good commercial control. When followed by the summer application excellent results were obtained. The summer spray alone however was ineffective.

The control of downy mildew *(Plasmopora viticola)* on the highly susceptible Fredonia, Agawam and Delaware grape varieties in the Niagara Peninsula requires special attention to the timing of applications. Since Fredonia is susceptible to infection of fruit clusters the pre-bloom application is most essential. On the other hand in the case of Agawam and Delaware, protection against foliage infection is required and the post-bloom and later cover sprays assume greater importance.

Bordeaux plus orthex spreader-adhesive was the most effective treatment. Bordeaux 5-5-100 compared favourably with the standard 7½-10-100 concentration. Basicop and Bordow copper fungicides were less efficient while Fermate and Phygon organic fungicides were unsatisfactory for control.

RESULTS OF FUNGICIDAL TRIALS FOR SCAB CONTROL IN ONTARIO

G. C. CHAMBERLAIN, Dominion Laboratory of Plant Pathology, St. Catharines, Ont.

Microfine sulphurs are the preferred fungicides for control of apple scab in Ontario. On the basis of greater safety to the trees these products have replaced lime sulphur to a great extent.

Organic fungicides have shown promise in combination with sulphurs or in split schedules. Ferric carbamate in the cover spray programme has been found more effective in checking secondary infection on fruit than the sulphurs. Mercurial fungicides have given outstanding control under serious infection conditions. When

applied after an infection period they have a distinct therapeutic value. Dichloronapthoquinone was found to possess excellent fungicidal value but remains in a doubtful category because of injury factors. Glyoxolidine fungicide and SR 406 were promising protective materials of apparently good lasting quality.

A BOTRYTIS CANE BLIGHT OF RASPBERRY

J. F. HOCKEY, Dominion Laboratory of Plant Pathology, Kentville, N.S.

A Botrytis cane blight of the cultivated red raspberry has been found in Nova Scotia since 1942. The organism is a strain of *Botrytis cinerea*. Thin, elongated, black sclerotia are produced under the epidermis of the overwintering canes. In the spring conidia are formed from the overwintering sclerotia. The disease may cause a severe cankering or death of the canes.

TESTING POTATOES FOR RESISTANCE TO LATE BLIGHT *PHYTOPHTHORA INFESTANS* (MONT.) DE BARY

J. L. HOWATT and W. A. HODGSON, Dominion Laboratory of Plant Pathology, Fredericton, N. B.

Due to the losses occasioned by the late blight and the high cost of control practices a project was initiated at Fredericton, N.B., in 1933, having as its objective the elaboration of blight resistant potato varieties. The breeding programme consists, in the main, of hybridizing the wild species *Solanum demissum* Lindl. with standard varieties of *Solanum tuberosum* L., and backcrossing to *Solanum tuberosum* L. in subsequent generations. All seedlings are tested for blight resistance by inoculating whole plants in the greenhouse with a conidial-zoospore suspension of the fungus. Detached leaves of all surviving plants are then tested in a specially constructed chamber under controlled environmental conditions. On the basis of their reaction the plants are grouped into seven classes varying from absolute immunity to extreme susceptibility. A total of 91,000 seedlings have been tested and a number of these are thought to be of some commercial value.

All seedlings are tested using an isolate of the fungus made about ten years ago and maintained since on potato dextrose agar and Green Mountain leaves.

No evidence has, as yet, been obtained to indicate that *Phytophthora infestans* gains in virulence by serial passage from a susceptible plant through an ascending series of increasingly resistant plants, or that biologic races of the fungus exist. Under controlled environmental conditions, wide discrepancies have been found in the reaction of the potato plant to infection. It is felt that extensive investigation of the cause of these discrepancies is necessary before a definite decision with regard to alteration in virulence or the existence of biologic races of the fungus can be made.

THE NUTRITION OF PHYTOPHTHORA SPP.

L. E. LOPATECKI and W. NEWTON, Dominion Laboratory of Plant Pathology, Saanichton, B.C.

The growth of four Phytophthora spp. is supported by inorganic N. *P. cactorum* grew well with NH, but not with NO. Conversely, *P. megasperma* grew well with NO, but not with NH. *P. parasitica* and *P. erythroseptica* grew well with either, but somewhat better with NO. All species are better supported by organic N, either asparagin or dl-alanine. Evidence is presented that Ca, Fe, Zn, Cu, Mn, and an unknown are required by *Phytophthora* spp., with the possible exception of Ca in the nutrition of *P. cactorum*. The optimum glucose and sucrose concentration for all species is close to 4%. The growth of *P. cactorum* is not depressed to the same extent as that of the other species by increasing the sucrose concentrations to 7% and 10%, due apparently to the secretion of less invertase by this species than by the others. The coefficient of sugar utilization is independent of sugar and thiamin concentration. In a nutrient solution containing all known nutrients, the growth of *P. parasitica* becomes progressively greater as the dl-alanine content is raised

from 0.2% to 1%, and the thiamin content from 0.2 mg. to 0.8 mg. per litre. In the solution at the 1% dl-alanine level this species has promise in the bioassay of thiamin, due to the straight line relationship upon plotting growth against thiamin concentrations.

PRELIMINARY STUDIES OF ROOT AND BASAL STALKROT OF CORN IN ONTARIO

W. E. McKEEN, Dominion Laboratory of Plant Pathology, Harrow, Ontario.

In Ontario rootrot of corn has gradually become more serious during the past decade and at present is markedly reducing yield and quality of the grain. This disease is prevalent in the spring and fall but is temporarily checked by high summer temperatures. Basal stalkrot, which is often the final phase of the disease, is apparently not caused by *Gibberella zeae*, as frequently reported, but by other organisms which move up from the necrotic roots. Root degeneration may be initiated by *Pythium arrhenomanes* Drechs., *Pythium debaryanum* Hesse, *Gibberella fujikuroi* (Saw.) Wr., *G. zeae* (Schw.) Petch, and *Rhizoctonia solani* Kuehn. *P. arrhenomanes* is the most economically important pathogen encountered and is capable of causing damage at much higher temperatures than the other pathogens mentioned. Isolations, pathogenicity tests and microscopic observations indicate that seedling susceptibility may be used as an indicator in resistance studies of all phases of this disease.

STRAWBERRY VIRUS IN BRITISH COLUMBIA

F. C. MELLOR and R. E. FITZPATRICK, Dominion Laboratory of Plant Pathology, Vancouver, B.C.

A separation of two virus components of the yellows disease of strawberries was achieved by making progressive transfers of aphids (*Capitophorus fragariae)* on *Fragaria vesca* plants using diseased Marshall strawberry plants as a source of inoculum. One of these components produced a severe disease of the crinkle type in *Fragaria vesca.* The plants became dwarfed with the leaves and petioles very much reduced in size and somewhat mottled and crinkled. Few runners were produced. This component was of the non-persistent type, the vector losing its infectivity in some time under six hours. The other component produced a less severe effect on *Fragaria vesca,* but the plants were definitely reduced in vigour. The leaves were cupped and yellowish, particularly at the margins, and the leaf surface was slightly puckered. There was, however, no reduction in runner production. This component required an incubation period of several days in the vector.

It was also shown that the main commercial strawberry variety grown in B.C., the British Sovereign, can be a symptomless carrier of a virus, which, when transmitted to *Fragaria vesca,* produces a disease of the crinkle type. This virus is of the non-persistent type.

The symptoms produced in *F. vesca* by the non-persistent component isolated from the yellows Marshall and those produced by the latent virus on the British Sovereign were similar.

AN INFRARED MICRO-ANALYSER FOR THE MEASUREMENT OF PHOTOSYNTHESIS, RESPIRATION, AND TRANSPIRATION OF PLANTS

WM. HAROLD MINSHALL, Division of Botany and Plant Pathology, Science Service Building, Department of Agriculture, Ottawa, Canada.

A description is given of a simple and relatively inexpensive apparatus for determining small changes in the concentration of carbon dioxide or of water vapour in a continuous air flow. The apparatus consists of a combustion furnace as a source of infrared radiations, 2 stainless steel tubes (6' x 1") for absorption cells, and two thermopiles connected in series opposition with a galvanometer for radiation measurements. This apparatus makes it possible to follow the time course of respiration, photosynthesis, and transpiration.

THE WHOLE EMBRYO METHOD OF TESTING BARLEY FOR LOOSE SMUT AS A ROUTINE TEST

R. C. RUSSELL, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

The percentage infection of *Ustilago nuda* in thirty samples of barley was determined by means of the embryo test (see Simmonds, P.M., Sci. Agric. 26 : 2 : 51-59. 1946). The embryos from 500 seeds of each sample were taken for examination. On the average about 475 embryos were obtained from each lot of 500. The percentage infection varied from none to 25 per cent. Other portions of the same seedlots were grown in the greenhouse, in field plots at Saskatoon, and in field plots at Indian Head. Spores from every head were germinated in order to cull out all those infected with *U. nigra.*

The percentages of seed showing infection, as determined by the embryo test, were compared with the percentages of infected plants in the greenhouse and field plots. The co-efficients of correlation between these percentages were over 0.97 in each set. It appears from these results that the embryo test gives a reliable indication of the amount of infection which will appear when a crop is grown from the seed in question. The embryo test offers a much more satisfactory method than the present one for determining whether or not to pass barley seed for certification, as far as loose smut is concerned. The three main reasons for making the above statement follow:

(1) Inspectors cannot distinguish with certainty between *U. nuda* and *U. nigra* in the field. (2) The inspector determines the percentage infection in the previous generation and not in the seed which is to be certified. Experiments have shown that the percentage infection in a standing crop does not necessarily agree closely with the percentage infection in the seed produced by that crop. (3) The present method discourages proper roguing of infected heads from seed plots, while the embryo test encourages it. Inspectors cannot make a true count of the amount of smut present, if some of it has been rogued out. Nevertheless, proper roguing is a great help in eliminating the disease and the more of it is done, the less infection will be found in the seed produced by that crop.

As for the relative merits of the embryo test and the growth test, the embryo test is preferable because it can be done much more quickly and it does not require any greenhouse space or field plot space. The data presented in this paper indicates that both tests show practically the same percentages of infection.

EFFECT OF DEFOLIATION ON SUNFLOWERS

W. E. SACKSTON, Dominion Laboratory of Plant Pathology, Winnipeg, Man.

Plants of the sunflower hybrid variety "Advance" growing in replicated plots at Winnipeg in 1948 were defoliated at the seedling stage (July 9), at full bloom (July 30), and when the seed was ripening (September 1), to simulate the effect of rust and other foliage diseases. Partial defoliation (50%) at full bloom reduced yield significantly. Partial defoliation, of seedling and ripening plants were respectively, caused slight, nonsignificant reductions in yield. Complete defoliation at full bloom caused greatest injury, reducing yield to less than 10% of that from check plots. Complete defoliation of seedlings reduced yield significantly. Yield reduction caused by complete defoliation of ripening plants approached significance.

The experiment was repeated on a larger scale at Winnipeg in 1949. Defoliation of sunflower plants in experimental plots and farm fields by grasshoppers, and larvae of the Painted Lady butterfly, suggests that the results of mechanical defoliation might provide information of value in assessing the importance of insect attack as well as of foliage diseases. Grasshopper damage in the plots was so severe as to obscure the effects of all experimental defoliation except complete defol.ation when the plants were in full bloom. Complete defoliation at full bloom reduced seed yield to less than 10% of the average yield from all the other plots. Yield differences among the other plots, both defoliated and checks, did not approach statistical significance.

THE OCCURRENCE OF *HELMINTHOSPORIUM SATIVUM* IN RELATION TO PRIMARY INFECTIONS IN COMMON ROOTROT OF WHEAT

P. M. SIMMONDS, B. J. SALLANS, and R. J. LEDINGHAM, Dominion Laboratory of Plant Pathology, Saskatoon, Sask.

Helminthosporium sativum P.K. and B. is one, and perhaps the main, pathogen involved in common rootrot of wheat and barley. Investigations have shown that conidia of this fungus are readily found in the surface soil, and on stubble, in most wheat fields. Incubation studies with stubble specimens collected at various points in Saskatchewan show the prevalence of *H. sativum* and also its erratic occurrence from field to field. Furthermore, surveys for common rootrot of wheat caused by *H. sativum* reveal sharp fluctuations in disease from field to field.

The importance of conidia in or on the surface of the soil, in causing primary infections, has been demonstrated by greenhouse experiments. Field surveys early in the season, indicate a similar source for primary infections under natural conditions. Other sources of primary infections are infected seed, mycelial fragments in the soil, and pieces of stubble in which the fungus may be established. Infected wheat seed is considered of minor importance in Saskatchewan. Studies with conidia taken from soil samples indicate good viability including over-winter survival. It has been shown by our work, and previously by others, that *H. sativum* may be inhibited in competition with soil bacteria.

The antibiotic influence of soil bacteria, which may be particularly active against conidia on the surface, might be one reason why infections from field to field are so erratic. If this interpretation is confirmed by further work, it opens up possibilities for the control of common rootrot through methods of soil cultivation and rotations. A more direct method of control might be accomplished by killing the surface-borne conidia through the application of fungicides.

Studies on the occurrence of conidia on the soil surface suggests a disease cycle as follows: (1) Conidia present in or on the surface soil cause primary infections; in time, new conidia are produced and new infections occur throughout the crop season, and (2) after harvest, conidial production continues from the stubble of plants which bore lesions. Thus, throughout the summer and fall, conidia are deposited on the soil, to be washed about by fall, winter, and spring rains. These conidia serve as inoculum for the next crop.

BOOK REVIEW

Diseases of Cereals and Grasses in North America. Roderick Sprague. xvi & 538. 81 figs. $7.00. Ronald Press Co., New York, 1950.

One of the circumstances that has discouraged investigation of the numerous so-called minor diseases of cereals and grasses is the fact that available information concerning them is so dispersed in various journals and miscellaneous publications that the task of assembling the data necessary to form the background of a study has often seemed formidable. This situation has been remedied by the appearance of Sprague's "Diseases of Cereals and Grasses in North America" which covers this whole field of study except for the rusts and smuts.

The author's own studies on a great number of leaf-spotting diseases of the graminaceae have qualified him particularly for the task of compiling this work. In fact, his own studies on *Ascochyta, Stagonospora, Cercosporella, Selenophoma* and especially on the important genus *Septoria* form the basis of one of the most important parts of the book.

The fungi discussed have been arranged alphabetically under the classes Phycomycetes (p. 5-52), Ascomycetes (p. 53-124), Basidiomycetes (p. 125-146), and Fungi Imperfecti (p. 147-436). It should be noted here that the last-mentioned class, which so often receives scant treatment in works on the fungi, is here given the attention it deserves owing to the great number and wide distribution of its species. There follows a 7-page glossary of terms, 80 pages of literature cited, an index of fungi and another of cereal and grass hosts. The alphabetic arrangement of genera within

each class and of species within each genus considerably facilitates the use of the book as does also a fairly rigid adherence to a standard treatment for each species, i.e., description of organism and symptoms, lists of hosts and places of occurrence, discussion of the disease and pertinent matters followed by a brief indication of the known world range of the species and (to the joy of the prospective investigator) a list of the chief references. A key is provided for each class and for most genera that contain several species.

Many of the species or subspecies (and there are about 400 included in the book), especially those of supposedly little economic importance, can not be definitely delimited in our present state of knowledge concerning them and the author makes no pretense that they can. He has nevertheless attempted such delimitation even in many instances where he realizes the imperfection of present knowledge. The student who wishes these fungi described and identified can scarcely quarrel with this procedure but it is well to remember that species and subspecies are man-made entities delimited on present knowledge and subject to further definition when additional information comes to hand. It should be added that when the author feels that a degree of uncertainty is involved in a given classification he generally does not hesitate to say so.

This book, attractively published and reasonably priced, and containing as it does a vast amount of well organized information on its subject, should be indispensible to any plant pathologist or mycologist concerned with the diseases of cereals and grasses.

T. JOHNSON

LIST OF PAPERS
PUBLISHED BY MEMBERS OF THE CANADIAN PHYTOPATHOLOGICAL SOCIETY

Between June 1, 1949, and May 31, 1950.

(In addition to abstracts published in Proc. Can. Phytopath. Soc. No. 17, 1949).

1. BLACK, L. M. Virus tumors. Survey of Biological Progress 1 : 155-231. 1949.
2. ———————— Visualization of tobacco mosaic virus within infected cells. Proc. Soc. Exp. Biol. & Med. 73 : 119-122. 1950 (Black, L. M., Councilman Morgan and Ralph W. G. Wyckoff).
3. ———————— Mechanical transmission of a plant tumor virus to an insect vector. Science 110 : 162-163. 1949. (Maramorosh K., M. K. Brakke and L. M. Black).
4. BROADFOOT, W. C. Loose smuts of barley. Can. Seed Growers' Assoc. Ann. Rept. 1948-49 : 51-54. 1949.
5. BROWN, A. M. and T. JOHNSON. Studies on variation in pathogenicity in leaf rust of wheat, *Puccinia triticina* Erikss. Can. Jour. Res. C, 27 : 191-202. 1949.
6. ———————— (See 28).
7. BUCHHOLTZ, W. F. A comparison of gross pathogenic effects of *Pythium graminicola, Pythium debaryanum,* and *Helminthosporium sativum* on seedlings of crested wheatgrass. Phytopath. 39 : 102-116. 1949.
8. BUCKLAND, D. C. The control of decay in mature timber. Western Pulp and Paper 2. 1949.
9. ————————, R. E. FOSTER and V. J. NORDIN. Studies in forest pathology. VII. Decay in western hemlock and fir in the Franklin River area, British Columbia. Can. Jour. Res. C, 27 : 312-331. 1949.
10. CALLBECK, L. C. Potato vine killing in Prince Edward Island. Amer. Potato Jour. 26 : 409-419. 1949.
11. CONNERS, I. L. and D. B. O. SAVILLE. Twenty-eighth annual report of the Canadian Plant Disease Survey 1948 : i-xix, 1-118. 1949.
12. FOLSOM, DONALD. Blueberry disease control. Testing new potato varieties for field resistance to leafroll. Deterioration and physical breakdown of potatoes in storage and transit. Strawberry variety trials. Cucumbers. *In* Sixty-fifth annual report of progress. Year ending June 30, 1949. Maine Agr. Exp. Sta. Bul. 473 : 20-21, 54-55, 69-70, 74. 1949.
13. FOSTER, R. E. Preliminary decay analysis of western hemlock in the Big Bend Region of British Columbia. Can. Dept. Agr. Div. Bot. & Pl. Path. Int. Rept. 1950. (Foster, R. E. and H. M. Craig).
14. ———————— (See also 9).
15. GREEN, G. J. (See 28 and 29).
16. HAGBORG, W. A. F. The effects of weather conditions on certain diseases of cereal crops. Proc. Ann. Conf. Man. Agron. 1949 : 19. 1949.
17. ———————— Use of 2,4-D as an inhibitor of germination in routine examinations of beans for seed-borne infection. Science 111 : 91. 1950. (Hagborg, W. A. F., Gladys M. Warner, and N. Agnes Phillips).
18. HILDEBRAND, A. A. Soybean diseases in Southwestern Ontario in 1948. 28th Ann. Rept. Can. Pl. Dis. Surv. 1948 : 30. 1949.
19. ———————— and L. W. KOCH. Observations on six years' seed treatment of soybeans in Ontario. Sci. Agr. 30 : 112-118. 1950.

20. HOCKEY, J. F. A review of the newer fungicides. Nova Scotia Fruit Growers' Assoc. Ann. Rept. 86 : 53-56. 1949. (Hockey, J. F. and R. G. Ross).

21. JACKSON, H. S. Studies of Canadian Thelephoraceae. IV. *Corticium anceps* in North America. Can. Jour. Res. C, 27 : 241-252. 1949.

22. ———— Studies of Canadian Thelephoraceae. V. Two new species of *Aleurodiscus* on conifers. Can. Jour. Res. C, 28 : 63-77. 1950.

23. ———— Studies of Canadian Thelephoraceae. III. Some new species from British Columbia. Can. Jour. Res. C, 27 : 147-156. 1949. (Jackson, H. S. and E. R. Dearden).

24. JACQUES, J. E. La santé des plantes. Réveil Hort. 6 : 16-21. 1950.

25. ———— Essais de destruction des plantes ligneuses avec le 2,4-D et le 2,4,5-T. Ann. de l'Acfas 15 : 148-150. 1949.

26. JOHNSON, T. Intervarietal crosses in *Puccinia graminis*. Can. Jour. Res. C, 27 : 45-65. 1949.

27. ———— Inheritance of pathogenicity and urediospore color in crosses between physiologic races of oat stem rust. Can. Jour. Res. C, 27 : 203-217. 1949.

28. ————, B. PETURSON, A. M. BROWN, and G. J. GREEN. Survey of nursery material for plant diseases in 1948. 28th Ann. Rept. Can. Pl. Dis. Surv. 1948 : 11-12. 1949.

29. ———— ———— and G. J. GREEN. Physiologic races of cereal rusts in Canada in 1948. 28th Ann. Rept. Can. Pl. Dis. Surv. 1948 : 13-15. 1949.

30. ———— (See also 5).

31. KOCH, L. W. Tobacco diseases in Ontario and Quebec in 1948. 28th Ann. Rept. Can. Pl. Dis. Surv. 1948 : 66-67. 1949.

32. ———— (See also 19).

33. LEDINGHAM, G. A. Industrial fermentations on waste sulphite liquor. Pulp and Paper Magazine of Canada 50(7) : 93-99. 1949.

34. ———— Production and properties of 2,3-Butanediol. XXXII. 2,3-Butanediol fermentations at poised hydrogen ion concentrations. Can. Jour. Res. B, 27 : 694-704. 1949.

35. LEDINGHAM, R. J., B. J. SALLANS and P. M. SIMMONDS. The significance of the bacterial flora on wheat seed in inoculation studies with *Helminthosporium sativum*. Sci. Agr. 29 : 253-262. 1949.

36. MASSEY, L. M. Keeping roses healthy! Amer. Rose Magazine 8(6) : 260-262. 1949.

37. ———— Keeping roses healthy! Amer. Rose Magazine 8(7) : 312-313. 1949.

38. ———— Keeping roses healthy! Amer. Rose Magazine 8(8) : 365-366. 1949.

39. ———— Keeping roses healthy! Amer. Rose Magazine 8(9) : 411-412. 1949.

40. ———— Keeping roses healthy! Amer. Rose Magazine 8(10) : 454-455. 1950.

41. ———— Keeping roses healthy! Amer. Rose Magazine 8(11) : 504-511. 1950.

42. ———— Crown gall. Amer. Rose Ann. 35 : 145-153. 1950.

43. ———— Protection against diseases and pests. Nors Notes — The New Orleans Rose Soc. pp. 2-4. May 1950.

44. McKEEN, C. D. Preliminary studies on a Pythium rootrot of Spanish onion seedlings. Sci. Agr. 30 : 125-131. 1950.

45. McKEEN, W. E. A study of sugar beet rootrot in southern Ontario. Can. Jour. Res. C, 27 : 284-311. 1949.

46. MEAD, H. W. Diseases of forage crops: Their nature, importance and control. Can. Seed Growers' Assoc. Ann. Rept. 1948-49 : 44-50. 1949.

47. NORDIN, V. J. The effect of decay on recoverable volume in hard maple in Ontario. Forestry Chron. 26 : 38-44. 1950. (Nordin, V. J. and J. D. Cafley).

48. ———————— (See also 9).

49. PETURSON, B. (See 28 and 29).

50. SACKSTON, W. E. Flax diseases and experiments in cultural control. Proc. Ann. Conf. Man. Agronomists 1949 : 20. 1949. (Abstract).

51. ———————— Sunflower diseases. Proc. Ann. Conf. Man. Agronomists 1949 : 20. 1949. (Abstract).

52. ———————— Symptoms resembling 2,4-D injury on *Acer negundo*. 6th Ann. North Central Weed Control Conf. 1949, Res. Rept. 145-146. 1949.

53. ———————— Date of seedings as a factor in flax disease control. Proc. Flax Inst. U.S.A. 1949, Minneapolis. 1949.

54. ———————— Flax diseases in western Canada in 1948. 28th Ann. Rept. Can. Pl. Dis. Surv. 1948 : 24-28. 1949.

55. ———————— Sunflower diseases in Manitoba in 1948. 28th Ann. Rept. Can. Pl. Dis. Surv. 1948 : 31-33. 1949.

56. SALLANS, B. J. (See 35).

57. SANFORD, G. B. Prevention of early decay of cut potato sets by chemical treatment. Sci. Agr. 29 : 345-350. 1949.

58. SAVILE, D. B. O. (See 11).

59. SIMMONDS, P. M. A review of some of our major plant disease problems. Ann. Rept. Sask. Branch Can. Seed Growers' Assoc. 1950 : 24-28. 1950.

60. ———————— (See also 35).

61. SKOLKO, A. J. (See 74).

62. STAKMAN, E. C. Science — its sphere of influence. Research 3 : 101-105. 1950.

63. ———————— Science and national authoritarianism. Proc. Amer. Philos. Soc. 94 : 114-120. 1950.

64. ———————— Soil nutrients as affecting susceptibility to plant disease. 41st Ann. Meet. Soc. Agron. and Soil Science Soc. Amer. 1949 : 100-101. 1949. (Stakman, E. C. and J. M. Daly).

65. SUTTON, M. D. (See 74).

66. THOMAS, G. P. Interim report on decay losses sustained in mature and overmature northern black cottonwood in the Quesnel region, British Columbia. Can. Dept. Agr. Div. Bot. & Pl. Path. Int. Rept. 1949.

67. ———————— Two new outbreaks of *Phomopsis lokoyae* in British Columbia. Can. Dept. Agr. Div. Bot. & Pl. Path. Int. Rept. 1949.

68. ———————— A preliminary investigation into the decay losses sustained in hemlock and amabilis fir in the Upper Kitimat region, British Columbia. Can. Dept. Agr. Div. Bot. & Pl. Path. Int. Rept. 1950. (Browne, J. E., A. T. Foster and G. P. Thomas).

69. THOMPSON, G. E. Witches' broom of Japanese walnut in Georgia. Pl. Dis. Reptr. 33 : 455. 1949. (Miller J. H. and G. E. Thompson).

70. ———————— Notes on some wood-decaying fungi of Georgia. Pl. Dis. Reptr. 34 : 128-134. 1950. (Campbell, W. A., J. H. Miller and G. E. Thompson).

71. VANTERPOOL, T. C. Flax diseases in Saskatchewan in 1948. 28th Ann. Rept. Can. Pl. Dis. Surv. 1948 : 22-24. 1949.

72. ———————— Chlorotic banding of cereal seedlings. Sci. Agr. 29 : 334-339. 1949.

73. ———————— A note on the cause of brittle dwarf of wheat. Sci. Agr. 29 : 351-353. 1949.

74. WALLEN, V. R., M. D. SUTTON and A. J. SKOLKO. The effect of actidione on the growth of certain pathogenic fungi and on the germination of pea seed. Phytopath. 40 : 156-160. 1950.

75. WILLISON, R. S. Virus diseases of stone-fruit trees. Ann. Appl. Biol. 37 : 127-130. 1950.

76. YARWOOD, C. E. Effect of soil moisture and mineral nutrient concentration on the development of bean powdery mildew. Phytopath. 39 : 780.788. 1949.

77. ———————— Effect of temperature on the fungicidal action of sulphur. Phytopath. 40 : 173-180. 1950.

78. ———————— Recent advances in the use of fungicides. Mins. 30th Ann. Conf. West. Pl. Board 128-134. 1949.

79. ———————— Fungicides for the control of powdery mildew. 2nd Int. Cong. Crop Protection 13-14. 1949. (Abstract).

80. ———————— Diurnal responsiveness of *Erysiphe graminis* to nutrients. Science 110 : 477-478. 1949. (Yarwood, C. E. and Morris Cohen).